



## Dr. Konstantin Doubrovinski

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### „Physical Aspects of *Drosophila* Gastrulation”

Epithelial morphogenesis is a ubiquitous developmental process whereby animal organs or their primordia form through remodeling of epithelial sheets. We use fruit fly gastrulation as a model to study epithelial morphogenesis. Prior to gastrulation the embryo is a hollow ball of cells made up of a single epithelium layer with its apical surface facing outwards. In the course of gastrulation a subset of cells in the ventral part of the embryo constricts apically. Simultaneously, the surface forms a depression. As the depression deepens, prospective mesoderm is brought into the interior of the embryo. Although many molecular players implicated in gastrulation have been characterized in impressive detail, the physical basis of this process remains poorly understood. In particular, basic understanding of the spatio-temporal scales associated with the accompanying tissue deformation is lacking. To address this problem we developed a novel experimental technique that allows for accurate quantitation of embryonic tissue deformation. Our method involves injecting fluorescent tracers into the developing embryo and tracking the motion of those tracers over time. Employing this protocol we show that cell shape changes that accompany gastrulation may be quantitatively understood in terms of Stokes flow of viscous cytoplasm. We further conduct magnetic microrheometry measurements that allow for assessment of visco-elastic properties of gastrula tissue. Combined with a range of genetic and pharmacological perturbations, these data suggest that the major elastic component of gastrula is the apical actin cortex, whereas cellular cytoplasm appears entirely viscous on developmentally relevant spatial and temporal scales. Finally, we conduct photoablation experiments that independently confirm the above conclusions. In summary, our results suggest that the interior of the embryo comprises an elastic cortex enclosing a layer of viscous cytoplasm. This finding suggests a physical mechanism underlying the out-of-plane deformation of the cellular layer during gastrulation.

**Dienstag, 09. Juli 2013, 14.00 c.t.**

**Gebäude E2 6, Seminarraum E.04**

**Saarbrücken**

Der Gast wird betreut von Karsten Kruse (Tel. 2763)

**Alle Interessenten sind herzlich eingeladen.**

Die Sprecher des SFB und des GRK  
Heiko Rieger, Ludger Santen und Manfred Lücke